

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER 2013****Subject Code: 152604****Date: 02-12-2013****Subject Name: Rheology of Rubber****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 Answer the following.**14**

- (i) Discuss Viscosity versus plasticity.
- (ii) Differentiate Rheopectic and thixotropic fluid.
- (iii) Write Eyring model.
- (iv) Define kinematic viscosity and derive its unit.
- (v) Draw the sketch of two forms of parallel plate compression plastimeter.
- (vi) Write in brief about working of Rotation plastimeter.
- (vii) How the stress relaxation is measured?

Q.2 (a) Describe the types of time independent non Newtonian fluids.**07****(b) Derive the equation of maximum velocity for flow through a circular tube.****07****OR****(b) Derive the expression for velocity distribution of Newtonian fluid flowing through an extruder.****07****Q.3 (a) Derive the equation for maximum velocity for pseudoplastic fluid in a flow of a falling film.****10****(b) Draw the table showing different viscometers and their viscosity range.****04****OR****Q.3 Derive the relation between angular velocity of cup and torque on the bob for a Bingham fluid placed in Cup & Bob Viscometer.****14**

-----P.T.O.-----

Q.4 (a) For an unknown polymer melt shear stress- shear rate data is given below. Apply power law model to this data and calculate the constants.**10**

$\tau \times 10^{-4} \text{N/m}^2$	$(-du / dr) \text{ s}^{-1}$
2.5	0.75
5.2	2.0
7.4	3.1
17.0	13.5
33.0	33.9
59.0	67.7
200.0	338.7
490.0	1354.8
780.0	3387.0
1120.0	5000.0
1550.0	7000.0

	(b)	Discuss in brief the rheology of mixing mill.	04
		OR	
Q.4	(a)	Discuss the effect of molecular weight, molecular weight distribution, and chain entanglements on viscosity of polymer melts.	08
	(b)	Write about the different phenomena which are known to occur when the melt starts flowing inside cavity of injection molding.	06
Q.5	(a)	Explain Maxwell and Voight model for Viscoelasticity.	08
	(b)	Describe falling sphere viscometer.	06
		OR	
Q.5	(a)	Write a note on penetrometers, orifice and indentation viscometer.	06
	(b)	Discuss Retardation phenomena.	08
